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rock and sheet asphalt were laid, the latter so successfully that its use has become widespread throughout the world.

It is commonly believed that the Incas of Peru made use of asphalt in building roads, but no evidence has ever been found to sustain that belief, and recent travelers have seriously questioned the excellence of those roads.

That asphalt was known to the ancients is a well-attested fact, its use as a binder for masonry in Babylon being in point, but of its use other than this we know nothing. Strabo tells us that as early as 2000 B.C. the streets of Babylon were paved, and so, too, presumably were the great roads leading out from the many gates of that city. Babylon was situated in the alluvial plain of Mesopotamia and its building material was almost entirely clay, either as such or in the form of bricks. It seems rather doubtful that these latter were used to pave the streets at that early date. Asphalt was abundant and much used in building operations, and it does not seem improbable that it was utilized to improve the streets. However, this is conjecture, for none of the reference books at hand contain any record of its use as a road-making material in those far-distant times.

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#### THE "WILLIAMS' PROCESS" OF PHOTOGRAPHY

TO THE EDITOR OF SCIENCE: It may be of interest to your readers to know that as of July 1, 1912, there has been dedicated to the free use of science and scientists the patented process for photographic illustrations (U. S. Pat. No. 640,060), owned by the undersigned and known among paleontologists, who found it especially useful in specimen work, as the "Williams' Process." In brief, it consists in the deposition by sublimation on the object to be photographed of an extremely tenuous monochrome film for the purpose of obviating the reflection, refraction and distorted shadow values common in ordinary photography of certain classes of objects.

It has been a matter of great regret to the

writer that a long-continued and expensive investigation, arising out of an entirely legitimate difference as to the scope and validity of the patent, has delayed until now the fulfillment of the original intention of the writer to make this dedication so soon as the expenses incurred in perfecting and establishing the patent should have been secured by the moderate royalties hitherto charged. The outcome of the controversy has entirely justified the writer's position: the opinion of the opposing experts conclusively confirming the fundamental character of the invention.

As one interested in science, the writer would have been pleased if his means had permitted the assumption of all the expenses of this patent without thought of recoupment, and is heartily sorry that there are those who felt that the failure to do so is culpable. If it is so, I can only plead that it is so in violation of no code with which I am familiar.

In view of the fact that the invention was originally made by my honored father, Dr. Henry Shaler Williams, of Cornell University, it is most desirable that certain facts be stated for the benefit of those who may in the past have been under a misapprehension as to his relation to the patent. Almost immediately after being granted the patent was transferred from him to me in good faith and in consideration of the assumption of debts incurred in its development. My father's wish always has been that the process should be made freely available to science gratis, and I promised him it should be as soon as its financial situation could be cleared up. It has never yielded a cent of profit to Henry Shaler Williams, nor was it taken over or ever handled with the idea of exploiting science or making commerce of its needs. This can not be stated too strongly. With the long-drawn-out controversy referred to my father has not only had nothing to do, but has repeatedly endeavored to induce me to abandon it.

Therefore the blame in the matter, if blame there be, is entirely mine and I cheerfully shoulder it; but he should be given complete exoneration from any such charge. Those who have been disposed to think critically of

Dr. Williams in connection with the patent have been doing a great and unwarranted injustice to a high-principled man, whose character and whose long and disinterested devotion to science should have made it unnecessary to break the silence he has long maintained, as I now do, without his knowledge, to right a wrong; and, as I sincerely hope, to remove completely any ground for misgiving on the part of any one of his many distinguished friends toward a loyal and worthy colleague.

ROGER H. WILLIAMS

#### SCIENTIFIC BOOKS

*Heredity and Eugenics.* A course of lectures summarizing recent advances in knowledge in variation, heredity and evolution and its relation to plant, animal and human improvement and welfare. By WILLIAM ERNEST CASTLE, JOHN MERLE COULTER, CHARLES BENEDICT DAVENPORT, EDWARD MURRAY EAST, WILLIAM LAWRENCE TOWER. The University of Chicago Press. Chicago, 1912. Pp. viii + 315. \$2.50 net, \$2.70 postage paid.

In view of the great leap which the study of genetics has taken in the past decade, and the notable contributions which are made almost daily, both in facts and in theories, it is hardly surprising that general systematic texts in the subject are not forthcoming at this time. Instead we have treatises of special phases of the subject, such as Mendelism or eugenics, and the publication of lectures, which are usually general summaries of more or less wide scope, attempting to keep abreast the times. Such a series of lectures delivered at the University of Chicago in the summer of 1911 is now presented to the public in book form. Considering the fact that "the lectures were given by five lecturers, with no opportunity to relate the lectures to one another other than as suggested by the assigned titles," the book, as a whole, presents a rather surprising unity, though somewhat lacking in balance and by no means covering uniformly the range of the subtitle. This, however, could not be expected under the circum-

stances, and the explanation in the preface disarms this criticism.

We are told that these lectures "were not intended for those trained in biology, but for a general university audience, interested in the progress of genetics as a matter of information rather than of study. The lecturers, therefore, did not address themselves to their colleagues. . . ." One familiar, however, with the "general university audience" not trained in biology, and with the difficulty the average student has in absorbing a working knowledge of such phenomena as dihybridism and multiple factors, is inclined to suspect that unless the lectures were supplemented with "asides" which are not included in the text, the "colleague," or at least the person who had made some previous study of the subject, carried more away from them than the person without preparatory biological training. It is safe to say that the comparatively small amount of repetition which occurs will prove no detriment to the general reader.

Professor Coulter undertakes the rather thankless task of paving the way for the real procession, which is to follow. In the first two chapters, dealing with "Recent Developments in Heredity and Evolution: General Introduction" and "The Physical Basis of Heredity and Evolution from the Cytological Standpoint," he has done this in an orthodox, but on the whole very clear and interesting, manner. The relation of the processes of inheritance to evolution, plant and animal breeding, and to eugenics, is pointed out and a cytological basis supplied upon which the Mendelist may hang his interpretations without compunction. Coulter, unlike many cytologists at the present time, evinces no hesitancy in placing upon the chromosomes the burden of hereditary transmission (p. 32).

In the third and fourth chapters Professor Castle treats of "The Method of Evolution" and "Heredity and Sex." These chapters are very similar to parts of the same author's recent book,<sup>1</sup> which is itself a series of lectures

<sup>1</sup> "Heredity in Relation to Evolution and Animal Breeding." D. Appleton & Co., New York, 1911.